

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE October 14, 1997	3. REPORT TYPE AND DATES COVERED Final January 1, 1994 to September 30, 1996		
4. TITLE AND SUBTITLE High Resolution Measurements of the Shallow Structure of the Oceanic Crust: The Rebuild of NOBEL		5. FUNDING NUMBERS N00014-94-1-0293		
6. AUTHOR(S) John A. Collins				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Woods Hole Oceanographic Institution Woods Hole, MA 02543		8. PERFORMING ORGANIZATION REPORT NUMBER 13029300		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Office of Naval Research Ballston Tower One 800 N. Quincy Street Arlington, VA 22217-5660		10. SPONSORING/MONITORING AGENCY REPORT NUMBER		
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The goal of this program was to build a deep-towed explosive source that would allow high resolution seismic experiments to be carried out on the ocean floor with a precision and resolving power that is not attainable in any other way. This source, which we call NOBEL (Near Ocean Bottom Explosives Launcher), has an operational depth of 6000 m and can carry, launch and detonate 47 10 lb. charges of explosive while being towed a few tens of meters above the ocean floor on a research vessel's conventional 0.68" coaxial cable. Following a completely successful cruise to the East Pacific Rise in early 1991, NOBEL was unfortunately lost in mid-1992 while carrying out a set of experiments over gas hydrate deposits off the East Coast of the U.S. The single objective of this program was to rebuild this unique seismo-acoustic source. Construction of the system is complete. NOBEL was used extensively on an NSF-funded cruise to the Mid-Atlantic Ridge in June of 1997. It was deployed on ten separate occasions and worked superbly each time. DTIC QUALITY INSPECTED 2				
14. SUBJECT TERMS Seismic Structure of Oceanic Crust; Underwater Explosives			15. NUMBER OF PAGES 1	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT	

Final Report of ONR Grant N00014-94-1-0293
High Resolution Measurements of the Shallow Structure Of The Oceanic Crust: The
Rebuild of NOBEL

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Objectives

The objective of this program was to build a deep-towed explosive source that would allow high resolution seismic experiments to be carried out on the ocean floor with a precision and resolving power that is not attainable in any other way. We call this source NOBEL (Near Ocean Bottom Explosives Launcher). Following a completely successful cruise to the East Pacific Rise in early 1991, during which more than 360 individual explosive charges were detonated within a few meters of the ocean floor in water depths of 2500-2600 m, NOBEL was unfortunately lost in mid-1992 while carrying out a set of experiments over gas hydrate deposits off the East Coast of the U.S. The single objective of this program was to rebuild this unique seismo-acoustic source. NOBEL provides us with the unique capability of generating in a controlled manner substantial low frequency seismic signals within a few meters of the deep ocean floor. Its operational depth is 6000m and it can carry, launch and detonate 47 5-10 lb. charges of pentolite explosive while being towed a few tens of meters above the ocean floor on a research vessel's conventional 0.68" coaxial cable. All aspects of the NOBEL design are dominated by safety considerations. Multiple levels of precautions prevent accidental detonations on deck.

Accomplishments and Results

Construction of the system is complete. In a joint experiment with the Naval Surface Warfare Center in April of 1995, we used components of NOBEL to detonate a series of deep (2500-4500 m) charges of both conventional pentolite and new chemical formulations. The high-fidelity source-signature measurements that we recorded (collins et al., 1997) are invaluable in NOBEL science programs. NOBEL was used extensively on an NSF-funded cruise to the Mid-Atlantic Ridge in June of 1997. It was deployed on ten separate occasions and worked superbly each time.

Publications

Collins, J.A., J. E. Broda, G.M. Purdy, J. Gaspin, T. Griffin, C. Peletski, L. Lipton, and B. Baudler, 1997. Source signature measurements of underwater explosives at very high ambient pressures, *accepted for publication, J. Acoust. Soc. Am.*

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